

Hearing Impairment in pseudoexfoliation syndrome

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Abstract

Aim: to compare the degree of sensorineural hearing loss in patients with and without pseudo exfoliation.

Materials and Methods: A comparative study design enrolling 44 patients each with and without pseudoexfoliation was employed. Pure tone audiometry was done to detect sensorineural hearing loss and to quantify the same according to WHO classification.

Results: 52.3% of patients in the group with pseudo exfoliation had mild sensorineural hearing loss, i.e., difficulty with faint speech. 6.8% had moderate sensorineural hearing loss. 40.9% had no significant hearing loss. In the group without pseudo exfoliation, 56.8% had no significant hearing loss while 29.5% had mild sensorineural hearing loss. 13.6% had moderate to moderately severe sensorineural hearing loss.

Conclusion: There is an increased incidence of hearing impairment in pseudo exfoliation syndrome though not statistically significant.

Keywords: Pseudoexfoliation, Sensorineural hearing loss.

Introduction

Pseudoexfoliation syndrome is a condition associated with deposition of dandruff-like material on the iris, cornea, anterior lens capsule, trabecular meshwork and lens Zonules.^{1-4,27,36,39} It is detected, most often, as an incidental finding in the Ophthalmology outpatient department. According to various cross sectional studies, the prevalence of pseudoexfoliation syndrome in South India ranges from 3.01% to 6% in the age group more than forty years.¹⁻³ It has a much higher prevalence in the age group more than 60 years.

Research over the past two decades have proved that pseudoexfoliation occurs in different parts of the body like blood vessels, skin, meninges, visceral organs, etc.⁴⁻⁷ This indicates that pseudoexfoliation syndrome may indeed be one of the manifestations of a systemic disease.¹¹⁻¹⁵

Eyes and ears are undoubtedly the most cardinal sense organs of the body. Pseudoexfoliation syndrome is a manifestation in the middle aged and elderly (usually more than forty years). The impact that any change in the vision or hearing ability could make in the quality of life of these patients cannot be understated.^{16,17} Research done in different ethnic groups have shown an association between pseudoexfoliation syndrome and hearing loss.⁴⁻⁷ to our knowledge, only one such study has been conducted so far in India.⁷

Pseudoexfoliation syndrome is associated with a higher incidence of secondary glaucoma (pseudoexfoliation glaucoma). The poor pupillary mydriasis, weakness of lens Zonules, increased incidence of vitreous loss and risk of corneal endothelial decompensation make the visual outcome of

ocular surgeries, especially cataract surgery in such patients' unpredictable.^{8-11, 34, 40}

Embryologically, the tectorial and basilar membranes in the inner ear and the anterior segment structures of the eye are partly derived from the neuroectoderm.^{8,9} Possible accumulation of pseudoexfoliation material on these structures may lead to sensorineural hearing loss due to the dysfunction of the mechanoreceptors of the ear. Deposition of fibrillar pseudoexfoliation material in the vessel walls¹⁰ may suggest similar changes in the vasculature of the inner ear causing a decrease in nourishment of the inner ear and worsening of the metabolism in the striae vascularis, which may lead to sensorineural hearing loss.¹⁸⁻²⁰

Keeping in mind the greater risk of visual deterioration in these patients due to glaucoma and cataract, it is important to detect any significant impairment in hearing as well so that early rehabilitation may be provided.

This study aims to compare the degree of sensorineural hearing loss between two groups of patients with and without pseudoexfoliation.

Materials and Methods

After obtaining ethical clearance from the institution (Dr. SMCSI Medical College, Karakonam), a comparative study was conducted between January 2015 to January 2017. 44 patients with and 44 patients without pseudoexfoliation (above forty years) were enrolled for the study. Exclusion criteria: history of congenital hearing loss, previous ear surgery, acute or chronic ear diseases, ear or head trauma, prolonged noise exposure, prolonged use of ototoxic drugs, vascular and systemic diseases that may be related to

hearing loss (eg: uncontrolled hypertension), patients with conductive or mixed hearing loss, ocular conditions associated with hearing loss, patients with true exfoliation of lens capsule.

Full ophthalmic examination including Snellen's uncorrected and best corrected visual acuity, slit lamp biomicroscopy, gonioscopy (Shaffer), Goldmann applanation tonometry, dilated fundus examination with +90D noncontact lens was performed in all patients.

Otologic examination was performed to rule out external and middle ear anomalies. It included ear inspection, otoscopy, nasopharyngeal examination and tuning fork testing. Using pure tone audiometry, the hearing threshold (minimal intensity of perceptible sound) was calculated for every ear, using air and bone conduction, at the frequencies of 250, 500, 2000, 4000 and 8000 Hz.

Based on pure tone audiogram, patients with conductive or mixed hearing loss were excluded. Calculation of mean hearing threshold (pure tone average) included the speech frequencies 500 Hz, 1000 Hz and 2000 Hz.^{23, 26}

Sensorineural hearing loss is characterised by no air-bone gap in audiometry. It is significant when mean hearing threshold (pure tone average) is above 25 dB. WHO has classified the degree of sensorineural hearing loss on the basis of pure tone audiogram taking the average of the thresholds of hearing for frequencies of 500,1000 and 2000Hz with reference to ISO:R.389-1970(International Calibration of Audiometers).⁴⁰⁻⁴³ WHO classified the degree of impairment from sensorineural hearing loss as follows:

Table 1: WHO classification of the degree of impairment from sensorineural hearing loss

Hearing threshold in better ear(average of 500,1000 and 2000 Hz) in dB	Degree of impairment (WHO classification)	Ability to understand speech
0-25	Not significant	No significant difficulty with faint speech
26-40	Mild	Difficulty with faint speech
41-55	Moderate	Frequent difficulty with normal speech
56-70	Moderately severe	Frequent difficulty even with loud speech
71-91	Severe	Can understand only shouted or amplified speech
Above 91	Profound	Usually cannot understand even amplified speech

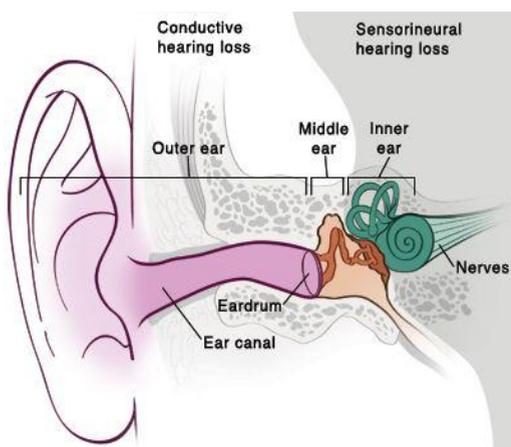


Fig. 3: Sensorineural hearing loss in the ear



Fig. 1: Dandruff like flaky material on the pupillary margin

Results

The functional impairment in hearing in the two groups was assessed. The hearing threshold in the better ear of the patient was taken to assess the degree of hearing loss in that patient.



Fig 2: Pseudoexfoliative material on the anterior lens capsule

Table 2: Hearing threshold in the better ear in patients with and without pseudoexfoliation

Pure tone average in the better ear	Pseudoexfoliation			
	Present		Absent	
	N	%	N	%
<= 25 (Not significant)	18	40.9	25	56.8
26-40 (Mild)	23	52.3	13	29.5
41-55 (Moderate)	3	6.8	4	9.1
56-70 (Moderately Severe)	0	0.0	2	4.5
Total	44	100.0	44	100.0

$\chi^2=6.060$ $df=3$ $p=0.109$

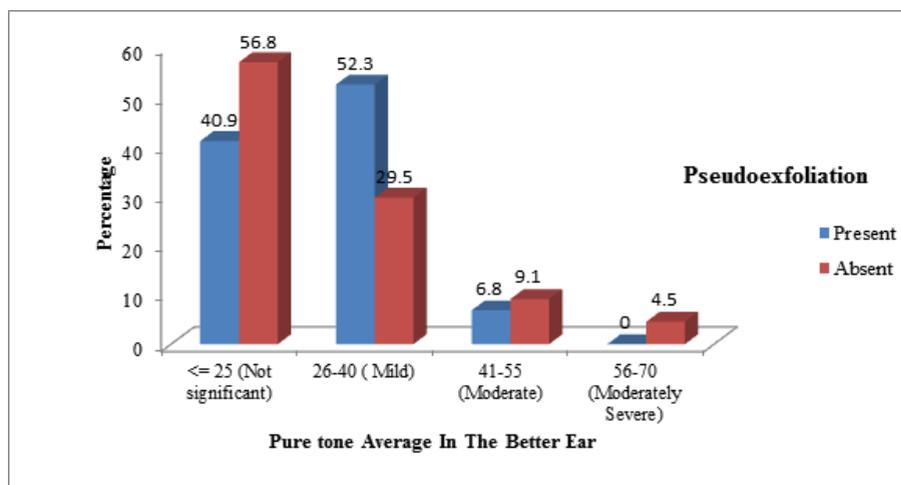


Fig. 4: Mean hearing threshold in the better ear in patients with and without pseudoexfoliation

From the table, it is evident that majority of the patients with pseudoexfoliation syndrome have mild hearing loss whereas in the group without pseudoexfoliation, majority had no hearing loss.

Discussion

Some of the initial studies like that done by Cahill et al⁴ compared the hearing thresholds of study subjects with the ISO 7029 median AAHL (Age Associated Hearing Loss) values to conclude if the patients had sensorineural hearing loss or not. The ISO 7029 values were calculated for Caucasian population and hence

studies on Indian subjects cannot employ the same method. In the study conducted by Cahill et al, 73.7% of the ears studied had sensorineural hearing loss (n=69). The mean age of study subjects was more than 75 years.¹² In the study conducted by Shaban et al, 87% had hearing thresholds higher than the ISO7029 standards(n=41).⁶

According to Shaban et al, of 41 patients studied 72 ears of 36 patients (87%) had a higher hearing threshold level (HTL) at 1, 2, 3 kHz (HTL 1, 2, 3) than the ISO 7029 median AAHL (Age Associated Hearing Loss)1, 2, 3 which included (44 ears) of 22 patients in

the male group (87%) and (28 ears) of 14 patients in the female group (82%).¹⁵

In a study conducted by Turacli et al, in the group with pseudoexfoliation, 66.7% had hearing loss at various levels (n=102). In the group without pseudoexfoliation, 61.4% had no hearing loss, and 38.6% had hearing loss. The difference between the two groups is statistically significant.¹⁴

In the study done by Sameena Kokab et al, 90% in the group (n=60) with pseudo exfoliation had sensorineural hearing loss in one or both ears compared to 61.6% in the group without pseudoexfoliation (n=60). The difference was statistically significant.⁷ This study was done in India but hearing thresholds were compared with ISO7029 standards to assess sensorineural hearing loss.

In the study conducted by Ozturk et al, 79.4% patients with pseudo exfoliation had sensorineural hearing loss while 26.3% of the subjects without pseudo exfoliation had sensorineural hearing loss (n=63). The difference in the proportion of sensorineural hearing loss between the two groups was statistically significant. Presence of hearing loss was accepted when the average hearing threshold was higher than 25dB.⁵

In our study, hearing threshold in the better ear is used to determine if there is impairment or not. It was found that though an increased number of patients with pseudoexfoliation had hearing impairment (59.1%) when compared to those without pseudoexfoliation (43.2%), though the difference is not statistically significant. The limitation of the study is that presbycusis and high frequency hearing loss has not been taken into account.

Conclusion

There is an increased incidence of hearing impairment in pseudoexfoliation syndrome though not statistically significant.

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